APPENDIX

Pending Claims

13. A mat for use as reinforcement for a resin composition to be used in forming an elongated, pultruded part of constant transverse cross-section using a pultrusion die, said mat comprising:

a first layer of continuous, generally longitudinally-extending fibers which provide longitudinal strength to the mat;

a second layer of generally transverse reinforcement fibers in association with the first layer of generally longitudinal fibers and oriented in a direction at an angle with respect to the longitudinal pull direction of the mat to provide transverse strength to the mat;

a third layer of diagonal transport fibers for the transverse reinforcement fibers, at least certain of the transport fibers extending diagonally of the first layer of generally longitudinally-extending fibers and oriented to provide shear strength stiffness and anti-skewing resistance to the mat; and

a batting layer comprising polymeric fibers, at least a portion of which extend through the thickness of the mat layers and interconnect the fibers of all of the layers to increase the shape-retaining capability of the mat during pultrusion of the part.

14. The mat of claim 13 wherein said batting layer is bonded to the other layers of the mat forming a monolithic body.

15. The mat of claim 13 wherein is provided a binding agent which bonds the mat layers into a monolithic body.

16. The mat of claim 13 wherein at least a portion of the batting layer fibers extend through the thickness of the mat layers and which extend through and interconnect the mat layers, are entangling fibers.

17. The mat of claim 16 wherein the entangling fibers are formed of a cut-staple material.

18. The mat of claim 16 wherein the fibers of the first layer are formed of glass and the entangling fibers are of a synthetic resin polymer.

19. The mat of claim 16 wherein at least certain of the entangling fibers are heat bonded to the fibers of the other layers of the mat.

20. The mat of claim 13 wherein a first portion of the transport layer fibers extend diagonally from one side of the mat to the other side and a second portion of the transport layer fibers extend diagonally from said other side to said one side.

21. The mat of claim 20 wherein the angle of the fibers of the first and second portions of the transport layer with respect to the longitudinally-extending fibers of the first layer is essentially the same.

22. The mat of claim 21 wherein the fibers of each of the first and second portions lie along respective straight lines at a common angle with respect to the line of the pull of the mat.

23. The mat of claim 13 wherein the fibers of said third transport layer are disposed at an angle in the range of about +30° to about +60° from about –30° to about –60° with respect to the longitudinal length of the fibers of the first layer.

24. The mat of claim 23 wherein the transport layer of fibers extend at opposite angles of about +45° and about –45° with respect to the longitudinally-extending fibers of the first layer.

25. The mat of claim 13 wherein the transverse reinforcement mat fibers are oriented in a direction at an angle of from about 60° to about 90° with respect to the longitudinally-extending fibers of the first layers.

26. The mat of claim 25 wherein the transverse reinforcement mat fibers are oriented in a direction at an angle of about 90° with respect to the longitudinally-extending fibers of the first layers.

27. A mat for use as reinforcement for a resin composition to be used in forming an elongated, pultruded part of constant transverse cross-section using a pultrusion dies, said mat comprising:

a first layer of continuous, generally longitudinally-extending fibers which provide longitudinal strength to the mat;

a second layer of generally transverse reinforcement fibers in association with the first layer of generally longitudinal fibers and oriented in a direction at an angle with respect to the longitudinal pull direction of the mat to provide transverse strength to the mat; and

a batting layer comprising polymeric fibers, at least a portion of which extend through the thickness of the mat layers and interconnect the fibers of all of the layers to increase the shape-retaining capability of the mat during pultrusion of the part, the batting layer being bonded to the other layers of the mat.

28. The mat of claim 27 wherein the generally longitudinally-extending fibers of the first layer includes fibers which extend at an angle of from about 0° to about +20° and from about 0° to about –20° relative to the direction of the pull of the mat.

65. A reinforcement mat adapted for use in manufacture of a pultruded part where the mat is pulled through a pultrusion die in a continuous longitudinal pull direction, said mat comprising:

a body having a pair of opposed outer surfaces which define the thickness of the mat, said body including elongated reinforcing fibers oriented in a direction transverse to said pull direction; and

batting material in contact with said reinforcing fibers and including polymeric staple fibers, a certain proportion of said staple fibers extending through at least a portion of said mat thickness and randomly entangled with and interconnecting said reinforcing fibers.

66. A reinforcement mat as set forth in claim 65, wherein the entangling staple fibers which extend through at least a portion of the mat thickness are hydro-entangled fibers.

67. A reinforcement mat as set forth in claim 65, wherein the reinforcing fibers extend substantially across the full transverse width of the mat.

68. A reinforcement mat as set forth in claim 65, wherein said generally transverse reinforcing fibers are disposed at an angle of about 60° to about 90° with respect to said longitudinal pull direction.

69. A reinforcement mat as set forth in claim 65, wherein said generally transverse reinforcing fibers are disposed at an angle of about 90° with respect to said longitudinal pull direction.

70. A reinforcement mat as set forth in claim 65, wherein is included transport fibers for the reinforcing fibers arranged at an angle to the reinforcing fibers, said

randomly entangled fibers extending through at least a portion of said mat thickness and interconnecting the transport fibers and the reinforcing fibers.

71. A reinforcement mat as set forth in claim 70, wherein said transport fibers include elongated fibers extending diagonally across substantially the full transverse width of the mat and at a predetermined angle with respect to said reinforcing fibers.

72. A reinforcement mat as set forth in claim 68, wherein said transport fibers include first and second elongated diagonal fibers extending diagonally across substantially the full transverse width of the mat with the first diagonal fibers oriented at an angle opposite the angularity of the second diagonal fibers.

73. A reinforcement mat as set forth in claim 72, wherein is provided transport fibers disposed at an angle in the range of about + 30° to about + 60° and transport fibers disposed at an angle of about – 30° to about – 60° with respect to the longitudinal pull direction.

74. A reinforcement mat as set forth in claim 73, wherein is provided transport fibers disposed at an angle of about + 45° and second transport fibers disposed at an opposite angle of about –45° with respect to said longitudinal pull direction.

75. A reinforcement mat as set forth in claim 65, wherein is provided a synthetic resin binder binding the entangling fibers with the reinforcing fibers.

76. A reinforcement mat as set forth in claim 65, wherein at least some of the entangling fibers are heat bonded to the transverse reinforcing fibers.

77. A reinforcement mat as set forth in claim 65, wherein the entangling fibers have a bending resistance less than that of the reinforcing fibers.

78. A reinforcement mat as set forth in claim 68, wherein said transport fibers include elongated fibers extending substantially in said longitudinal pull direction.

79. A reinforcement mat as set forth in claim 70 wherein said elongated transport fibers include stitch defining fibers extending in said pull direction of the part.

80. A reinforcement mat as set forth in claim 79, wherein said reinforcing fibers are of glass and said elongated stitched fibers are of a polyester resin.

81. A reinforcement mat as set forth in claim 78, wherein said elongated fibers include fibers which extend an angle of from about 0° to about +20° and from about 0° to about –20° relative to said longitudinal pull direction.

82. A reinforcement mat as set forth in claim 65, wherein is provided a series of perforated holes through the thickness of the mat.

83. A reinforcement mat as set forth in claim 82, wherein the series of holes through the thickness of the mat are punched holes.

84. A reinforcement mat as set forth in claim 82, wherein said holes are filled with a resin which increases the reinforcement properties of the reinforcing fibers.

85. A reinforcement mat adapted for use and manufacture of a pultruded part where the mat is pulled along with longitudinal fibers through a pultrusion die in a continuous longitudinal pull direction, said mat comprising:

a body presenting a pair of opposed outer surfaces defining the thickness of the mat,

said body including elongated reinforcing fibers oriented in a direction transverse to said pull direction and arranged to provide transverse strength to a pultruded part containing the mat; and

said body including fiber means including polymeric entangling staple fibers extending through at least a portion of said mat thickness and randomly entangled with said reinforcing fibers, said fiber means being operable to carry the transverse fibers through the pultrusion die and to provide longitudinal strength, shear strength and anti-skewing resistance to the mat during pultrusion of a part reinforced with the mat.

86. The reinforcement mat according to claim 85, wherein said fiber means includes at least one layer of randomly oriented staple fibers and at least one layer of transport fibers arranged at an angle to the reinforcing fibers.

87. The reinforcement mat according to claim 86, wherein said transport fibers include elongated fibers extending diagonally across substantially the full transverse width of the mat and at an angle with respect to said reinforcing fibers.

88. The reinforcement mat according to claim 87, wherein said fiber means includes first and second elongated diagonal fibers extending diagonally across substantially the full transverse width of the mat with the first diagonal fibers oriented at an angle opposite the angularity of the second diagonal fibers.

89. The reinforcement mat according to claim 86, wherein said transport fibers includes elongated fibers extending substantially in said longitudinal direction.

90. The reinforcement mat according to claim 87, wherein said transport fibers includes elongated fibers extending substantially in said longitudinal direction.

91. The reinforcement mat according to claim 86, wherein said transport fibers includes elongated fibers extending substantially in said longitudinal direction.

92. The reinforcement mat according to claim 89, wherein said elongated transport fibers comprise stitched fibers.

93. The reinforcement mat according to claim 85, wherein the fiber means includes a binder interconnecting the reinforcing fibers and the fiber means of the mat.

94. The reinforcement mat according to claim 85, wherein the entangling staple fibers which extend through at least a portion of the mat thickness are hydro-entangled fibers.

95. The reinforcement mat according to claim 85, wherein the entangling fibers have a bending resistance less of that of the reinforcing fibers.

96. The reinforcement mat according to claim 85, wherein at least some of the entangling fibers are heat bonded to the transverse reinforcing fibers.

121. The mat of claim 13 comprising a permeability of about 200 to about 400 cubic feet per minutes of air at a pressure differential of 0.5 inches of water.

122. The mat of claim 13 comprising a permeability of about 600 to about 800 cubic feet per minute of air at a pressure differential of 0.5 inches of water.

123. The mat of claim 65 comprising a permeability of about 200 to about 400 cubic feet per minute of air at a pressure differential of 0.5 inches of water.

124. The mat of claim 65 comprising a permeability of about 600 to about 800 cubic feet per minute of air at a pressure differential of 0.5 inches of water.

125. The mat of claim 85 comprising a permeability of about 200 to about 400 cubic feet per minute of air at a pressure differential of 0.5 inches of water.

126. The mat of claim 85 comprising a permeability of about 600 to about 800 cubic feet per minute of air at a pressure differential of 0.5 inches of water.